

The head very large, heavily chitinized, and deep brown in color. Average width 0.66 mm. Sharply constricted in the posterior region, forming a distinct neck. Mandibles (fig. 7) 0.35 mm. in length, and sickle-shaped. The maxillae large, conical in form, and extending much beyond the anterior margin of the head and mandibles. One pair of light spots, possibly sensoria, ventrally behind the middle transverse line.

The body segments decreasing in width caudad, with the anterior margin of each having a minutely pebbled appearance, this being uniform over the last two segments.

Fourth-stage Larva (Fig. 5). Fourteen-segmented, 3.5 mm. in length and 0.9 mm. in width. Eight pairs of spiracles, the first, on the second thoracic segment large, the remaining seven small and inconspicuous, possibly not open. The lateral tracheal trunks heavy, with large anterior and posterior commissures. The head large but not heavily chitinized, and with simple mandibles (Fig. 8) 0.18 mm. in length. The body segments subequal in length except the last two, which are longer, the caudal one being much extended. No dermal setae or spines.

Fifth-stage Larva (Fig. 6). Fourteen-segmented, 9 to 11 mm. in length, very robust, and largely brown in color because the contents of the digestive tract show through the derm. Eight pairs of open spiracles, situated on the second and third thoracic and the first six abdominal segments.

The head relatively large, and truncate in form. The mouthparts comprising a large suctorial disc and tridentate mandibles (Fig. 9) 0.14 mm. in length. Antennae conical in form, with 2 short, blunt sensoria at the tip.

Body broadest in the mid-abdominal region, the segments subequal in length, the last tapering to a sharp point. No dermal setae or spines.

Pupa. No distinctive characteristics except that the tip of the abdomen is sharply curved ventrally in the manner typical of the adults.

NEW TERMITES FROM THE ANTILLES AND MIDDLE AMERICA.

By THOS. E. SNYDER, Senior Entomologist, Bureau of Entomology, United States Department of Agriculture.

The following miscellaneous termites are herein described as new:

Family KALOTERMITIDAE.

Kalotermes (Kalotermes) bequaerti. Cuba.

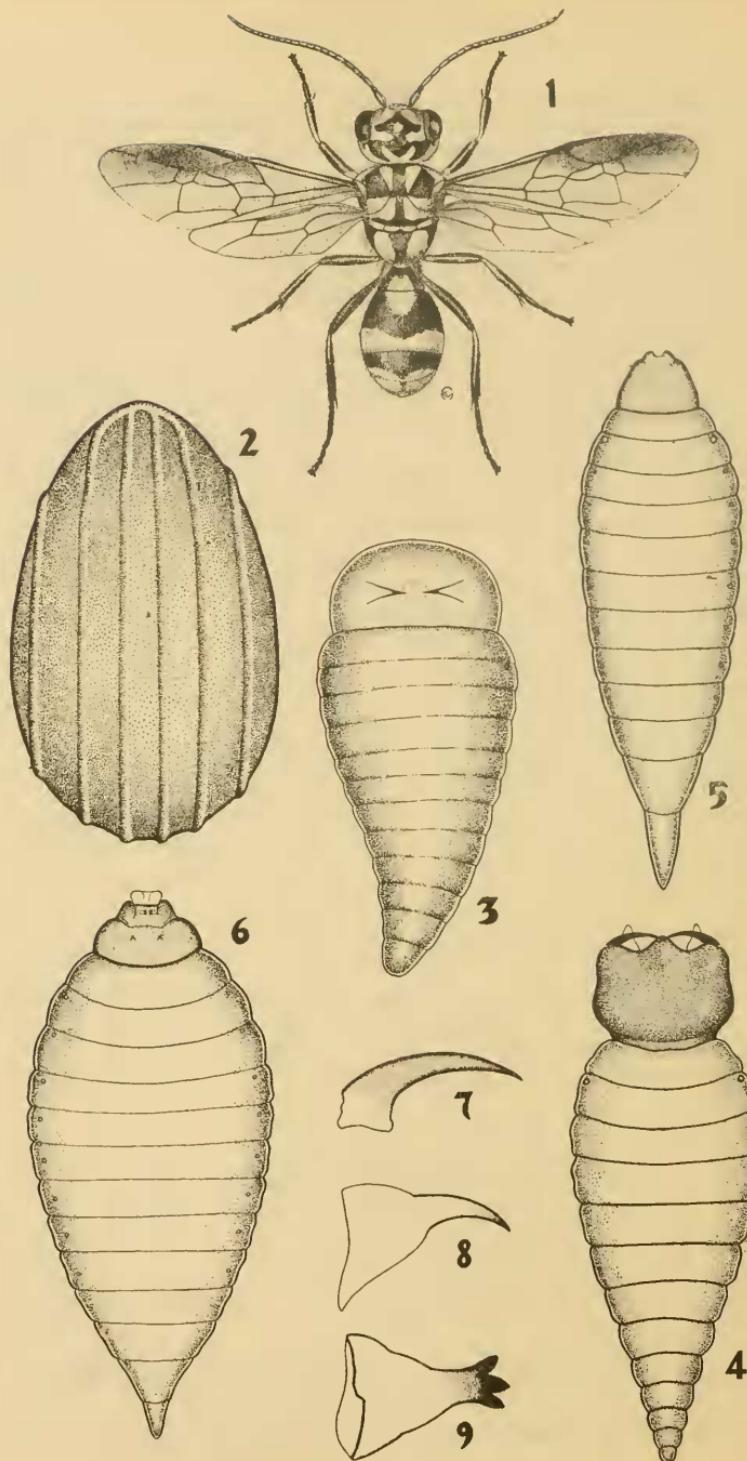
Kalotermes (Kalotermes) liberatus. Jamaica.

Family TERMITIDAE.

Cornitermes (Cornitermes) acignathus Silvestri, subspecies *walkeri*.
Panama.

Cornitermes (Cornitermes) acignathus Silvestri, subspecies *costaricensis*. Costa Rica.

Cylindrotermes macrognathus Panama



PECTINOGONALOS HENICOSPILI ROHWER.

Figure 1, adult; 2, egg; 3, 4, 5, 6, second, third, fourth and fifth stage larvae respectively.

H. Hagen in 1858 (Linn. Ent., vol. 12, pp. 67-8) described *Calotermes posticus* from the dealated female adult from St. Thomas, stating it to be near "*Calotermes*" *brevis* Walker; the latter species is in the subgenus *Cryptotermes* Banks.

In 1910, N. Holmgren in *Termitenstudien* 2 (Kungl. Sv. Vet. Akad. Hd. 46, no. 6, p. 55, refers to *C. posticus* Hag. as doubtfully a species of *Cryptotermes*.

Nathan Banks, in *Antillean Isoptera* (Bull. Mus. Comp. Zool., vol. 62, no. 10, p. 477-479, Pl. I, figs. 8 and 12, 1919), described the soldier caste of a termite from Jamaica as *Kalotermes posticus* Hagen, stating that it might not be the soldier of *posticus*, if not, it was new. Winged forms (discussed in a key) are from St. Thomas, Cuba and Haiti.

Since the identity of *posticus* is in great doubt, and it is quite probably a *Cryptotermes*, possibly *cavifrons* Bks., which occurs in the Antilles, I am giving the specimens referred to by Banks the name *liberatus*. Unfortunately, I can not name them for Mr. Banks, having already described a termite as *Kalotermes banksi*.

Kalotermes (Kalotermes) liberatus, new species.

Soldier.—"Head yellowish; mandibles red-brown, tips black, pronotum faintly brownish, body rather a dull yellowish, legs and antennae pale. Head about twice as long as broad, sides parallel, scarcely convex, broadly rounded behind, in front rather suddenly declivous, clypeus subquadrate; mandibles not as long as width of head, stout, toothed about as usual; antennae short, hardly longer than width of head, third joint not modified; eyes not noticeable; pronotum more than twice as broad as long, concave in front, slightly convex behind, sides rounded, hardly narrowed behind; head and body with scattered moderately long, erect hairs; legs short, hind femora much swollen. Length of head, 3 mm."

Type-locality.—Cinchona, Jamaica.

Type, soldier.—Amer. Museum Natur. Hist., New York City.

Kalotermes (Kalotermes) bequaerti, new species.

Winged adult.—Head light castaneous-brown, with numerous long hairs and fewer short hairs.

Antenna with 15 segments; third segment longer than second or fourth; last sub-elliptical, short and narrow.

Eye black, rather large, separated from lower margin of head by a distance less than half the diameter of the eye.

Ocellus elongate, narrow, in contact with and at oblique angle to eye.

Pronotum light castaneous-brown; with rows of long hairs on margins and a

¹Description of *posticus* by Banks, 1919.

median row, fewer short hairs; broader than head; roundly emarginate at both anterior and posterior margins.

Wings hyaline, yellow near costal margin; radius nearer to subcosta than to cubitus; in forewing subcosta with 4 long branches to costa; cubitus nearer to upper than lower margin of wing.

Abdomen yellow-brown; tergites with a row of long hairs near posterior margins.

Pulvillus between tarsal claws prominent.

Measurements.—Length of entire winged adult¹: 9.75—10.50 mm.

Length of entire dealated adult: 5.25—6.75 mm.

Length of head (to tip of labrum): 1.20—1.25 mm.

Length of pronotum (not at median): 0.65—0.70 mm.

Length of forewing: 7.80—8.00 mm.

Length of hind tibia: 0.70—0.80 mm.

Diameter of eye (long diameter): 0.26—0.27 mm.

Width of head (at eyes): 0.90—0.95 mm.

Width of pronotum: 1.00—1.05 mm.

Width of forewing: 2.15—2.20 mm.

Soldier.—Head yellow-brown with reddish tinge, darker at anterior margin; elongated normally; sides straight and parallel; front with slope at epicranial suture; with scattered short and long hairs. Gula slender.

Antenna with 11 segments, third segment greatly modified, chitinized, light castaneous brown, subclavate, longer and broader than second segment, or third and fourth together; last segment subelliptical, short and narrow.

Eye spot not colored, oval and at an angle to rim of antennal socket, separated from this rim by a distance about equal to the long diameter of the eye spot.

Mandibles black, short, stout, incurved at apex. Left mandible with a pointed marginal tooth near apex, two molars, and a large pointed tooth near base; right mandible with two large, pointed marginal teeth between middle of mandible and base.

Pronotum yellow, anterior margin broadly, angularly emarginate, finely serrate; posterior margin slightly emarginate; anterior corners high; sides narrow towards posterior margin; with scattered long and short hairs.

Abdomen with tergites light yellow; long hair near posterior margins.

Legs with hind femora markedly swollen.

Measurements.—Length of entire soldier: 5.00—7.00 mm.

Length of head with mandibles: 2.5—3.1 mm.

Length of head without mandibles (to anterior): 1.7—2.1 mm.

Length of left mandible: 1.00—1.10 mm.

Length of pronotum (from anterior to posterior margins at sides): 0.80—1.00 mm.

Length of hind tibia: 0.70—0.90 mm.

Width of head (where widest posteriorly): 1.00—1.40 mm.

Height of head at middle: 0.80—0.90 mm.

Width of pronotum: 1.10—1.55 mm.

¹The females average slightly larger than the males.

Type locality.—Banos (Oriente), Cuba.

Described from a large series of male and female winged adults, soldiers and nymphs collected in dry, dead branch near edge of mangrove, March 21, 1925, by J. Béquaert. Named in honor of the distinguished collector, who is now entomologist in the Department of Tropical Medicine, Harvard Medical School, Boston, Mass.

Cotypes.—(Winged adults.) Cat. No. 41742 U. S. National Museum; morphotypes (soldiers), U. S. National Museum. Coparatypes at the Museum of Comparative Zoology, Cambridge, Mass.

Key to Antillean Species in the Subgenus Kalotermes.¹

Winged.

1. Head and thorax red-brown, small species not 10 mm. long....*liberatus* Snyder.
Head and thorax light castaneous-brown, usually at least 10 mm. long
.....*bequaerti* Snyder.
Head and thorax pale yellowish, larger species..... 2
2. Body with bristly hair.....*schwarzii* Banks
Body with only very short, fine hair.....*jouetii* Banks.

Soldiers.

1. Third antennal segment scarcely if any longer than second..... 2
Third antennal segment plainly longer than second..... 3
2. Eye spot black, mandibles not very broad.....*mona* Banks
Eye spot black, mandibles very broad.....*cubanus* Snyder
Eye spot hyaline.....*schwarzii* Banks
3. Eye spot black, gula very broad.....*jouetii* Banks
Eye spot hyaline, gula very slender.....*liberatus* Snyder
Eye spot hyaline, gula slender, anterior margin of pronotum finely serrate
.....*bequaerti* Snyder

After an examination of Silvestri's cotypes in 1927, Dr. A. E. Emerson, of the University of Pittsburgh, states that specimens of *Cornitermes* from Panama and Costa Rica determined by me as *acignathus* Silv. are close to type but need varietal or subspecific names. *C. pugnax* Emerson from British Guiana is closely related to, but distinct from, *acignathus*. I am naming the subspecies from Panama after a former Governor of the Canal Zone, Panama, Brigadier General Meriwether L. Walker; the subspecies from Costa Rica is named *costaricensis*.

The dealated male adult of *walkeri* has already been described by the writer under the name *Cornitermes (C.) acignathus* Silvestri, in the Journal Agricultural Research, U. S. Dept. Agric., Vol. XXIX, no. 4, p. 187, Aug. 15, 1924.

¹Adapted from Banks, 1919.

Cornitermes (C.) acignathus Silvestri, *walkeri*, new sub-species.

Soldier.—Head yellow-brown, broadest posteriorly, with a few scattered fairly long hairs.

Frontal tube elongate, slender, upturned, at oblique angle to head.

Mandibles piceous, curved, broad at base, slender, sharp pointed and incurved at apex; marginal teeth as in figure 1. On left mandible, the fine marginal serrations on the apical third are more prominent than in *costaricensis*.

Antenna with 15 segments. Pronotum yellow with long hairs on margins, anterior margin slightly emarginate. Abdominal tergites with numerous long hairs.

Type locality.—Rio Tapia, Republic of Panama.

Described from a series of soldiers collected with workers at the type locality in a decaying log on February 7, 1924, by the writer.

Type, soldier.—Cat. No. 41743, U. S. National Museum.

Cornitermes (Cornitermes) acignathus Silvestri, *costaricensis*,
new subspecies.

Soldier.—Head with a distinctive reddish tinge, broadest posteriorly, with scattered fairly long hairs, more numerous than in *walkeri*.

Frontal tube not as elongate or as slender as in *walkeri*, upturned at oblique angle to head.

Mandibles piceous, curved, broad at base, slender, pointed and incurved at apex, marginal teeth as in figure 2.

Antenna with 15 segments, segments more slender than in *walkeri*.

Pronotum yellow, with long hairs on margins, anterior margin very slightly emarginate.

Abdominal tergites with numerous long hairs.

Type locality.—Hamburg Farm, near San Jose, Costa Rica.

Described from a series of soldiers collected with workers, November 26, 1925, by F. Nevermann, in decaying wood.

Type soldier.—Cat. No. 41744, U. S. National Museum.

Measurements

<i>Cornitermes (C.) acignathus</i>	<i>Cornitermes (C.) acignathus</i>
Silv., subspecies <i>walkeri</i>	Silv., subspecies <i>costaricensis</i> Snyder. Costa Rica
Snyder. Panama.	
Length of head with mandibles	4.70-4.80 mm.
Length of head to base mandibles	3.50-3.60 mm.
Length of left mandibles	1.50 mm.
Length of frontal tube (from beneath, taken from angle in profile)	0.50-0.55 mm.
Length of hind tibia	2.40 mm.
Width of head	3.00-3.01 mm.
Width of pronotum	1.50 mm.
Thickness of head not including frontal tube	2.20 mm.
	0.40-0.50 mm.
	2.35 mm.
	2.90-3.00 mm.
	1.40 mm.
	2.10 mm.

Doctor Emerson's summary after examination of the cotypes of *acignathus* is substantially as follows:

The typical soldier of *Cornitermes acignathus* Silv. is somewhat larger than *C. pugnax* Emerson, has a proportionately wider head with a few scattered long hairs; the small serrations anterior to notch in left mandible and posterior to notch are not as distinct as in *pugnax*. Inner edge of right mandible curving convexly anteriorly to notch much more so than in *pugnax*, causing a sharper angle in the notch. Posterior to the notch there is a small concave curve not present in *pugnax*. The species are undoubtedly distinct, but closely related.

The soldier of *C. acignathus* is very close to but a little larger than forms from Rio Tapia, Republic of Panama; the mandibles from the notch out are proportionately a little longer; the frontal tube is proportionately a little shorter (quite perceptibly); the gular region is close. Both the Panama and Costa Rica forms are much closer to the typical form from Ecuador, in regard to the mandibles, than is *acignathus* to *pugnax*. The typical soldier of *acignathus* is very similar to specimens from Hamburg Farm, Costa Rica (near San Jose); the frontal tube is a little smaller, the mandibles from the notch outward are proportionately a little longer; in profile the frontal tube is not as much turned up; the segments of the antennae are conspicuously shorter and thicker proportionately (*pugnax* is intermediate between the two in this respect). The gular region is very similar. The size is about the same.

Cylindrotermes macrognathus, n. sp.

In 1926 (Proc. U. S. Nat. Mus., Vol. 68, art. 14, p. 58-9), the writer referred to a species of *Cylindrotermes* from Panama as possibly *nordenskiöldi* Holmgren described from Bolivia. Recently Dr. Alfred Emerson, of the University of Pittsburgh, has seen Holmgren's type and discovered that the Panama specimens represent a new species with longer mandibles than *nordenskiöldi*. I am naming this species *macrognathus* in contrast to an undescribed species collected by Emerson in British Guiana.

Soldier.—Head yellow, elongate, posterior margin rounded, faint trace of eye spot, with numerous fairly long hairs. Frontal gland opening small, located at apex of epicranial suture. Gula slender at middle.

Antenna with 11-12 segments, third segment showing a tendency to divide.

Mandibles reddish brown, elongate, wide, curved, incurved and sharp-pointed at apex, a single tooth near the base.

Pronotum light yellow, margins with long hairs, anterior lobe distinct, very weakly emarginate in middle.

Abdominal tergites with long hairs.

Measurements.—Length of entire soldier: 4.20-4.60 mm. Length of head with mandibles: 2.25-2.35 mm. Length of head to mandibles: 0.80 mm. Length of pronotum: 0.37-0.40 mm. Length of hind tibia: 0.62-0.70 mm. Width of head: 0.95-1.00 mm. Width of pronotum: 0.65 mm. Hairs on head longer than in *brevipilosus* Sny. from Bolivia; differs from *Nordenskiöldi* by wider head, shorter pronotum and darker, heavier mandibles, and from Emerson's undescribed species by the wider head and the longer mandibles.

Type locality.—Barro Colorado Island, C. Z., Panama.

Described from a series of soldiers, collected with workers and nymphs by the writer at the type locality on February 21, 1924; also collected at Rio Chinilla, R. P.

Type, soldier.—Cat. No. 41745 U. S. National Museum.

Specimens collected in 1926 by F. Nevermann at Hamburg Farm, near San Jose, Costa Rica, also appear to be this species.

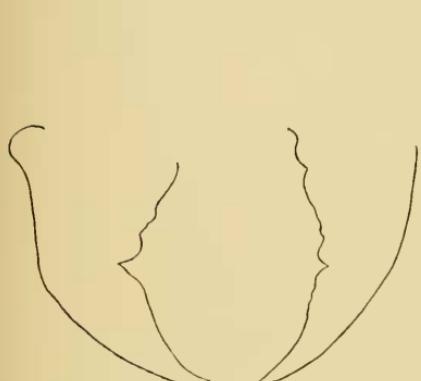


Fig. 1.

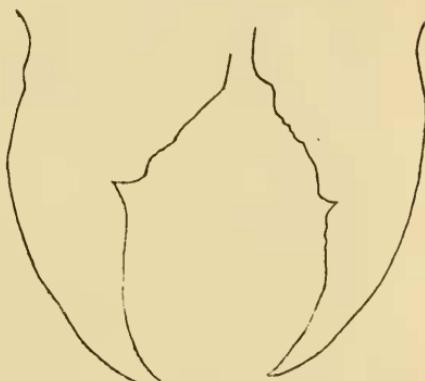


Fig. 2.

A HANDBOOK OF THE DRAGONFLIES OF NORTH AMERICA.¹

By JAMES G. NEEDHAM AND HORTENSE BUTLER HEYWOOD.

This book should be hailed with enthusiasm by students of the American Odonata. It is interestingly and lucidly written and contains keys and other information essential to the identification both of adults and known nymphs, from ordinal to specific rank. The matter is arranged in two parts. The first discusses in a delightful way the natural history of the various forms, and the second contains illustrated, easily assimilated information on the taxonomy of the American species. The descriptive matter is so fully annotated with respect to environment, phenology and behavior as to render it unusually valuable.

The illustrations, consisting chiefly of excellent line drawings, are of practical value throughout and an abridged but well selected bibliography is appended.

The letterpress and binding are all that could be desired and it is no exaggeration to say that this work will be found indispensable by students of the Odonata of North America.—W. R. Walton.

¹Charles C. Thomas, Springfield, Ill., \$7.00 net.